THE AMERICAN
JOURNAL OF PHARMACY

AUGUST, 1910

CHEMICAL EXAMINATION OF THE TUBEROUS ROOT OF IPOMŒA HORSFALLIÆ, *HOOKER.*

By Frederick B. Power and Harold Rogerson.

A Contribution from the Wellcome Chemical Research Laboratories, London.

In the Spring of 1909 one of us was kindly presented by Mr. E. M. Holmes, F.L.S., Curator of the Museum of the Pharmaceutical Society of Great Britain, with a large tuberous root which had been received from the West Indies, and was evidently the product of a species of *Ipomœa.* It had been sent to Mr. Holmes by Messrs. Westmacott & Son, of Manchester, England, who had likewise favored him with the following information concerning it. "It grows wild, and is not cultivated for any purpose. This specimen was gathered in the woods of Maypen, Clarendon District, Jamaica, by our client, Col. Barlow, of Bury, who states that it is used for starch making, although it produces a yellow product, and that it is also used for food in some instances."

The root in question was a very large one, and, as it could not conveniently be preserved in its entire, fresh state, it was thought that it might be utilized for a chemical examination, so far at least as the amount of material would permit. Some additional interest was imparted to the subject by the fact that the present authors had recently made a complete chemical study of the stems of *Ipomœa purpurea,* Roth,[1] and also of the official jalap,[2] from *Ipomœa Purga,* Hayne (*Exogonium Purga,* Benth).

In order to ascertain the botanical source of the root referred

[1] This Journal, 1908, **80**, pp. 251–286.

[2] *Journ. Amer. Chem. Soc.*, 1910, **32**, pp. 80–113.

to, Mr. Holmes had obtained from Jamaica, through the kindness of Col. Barlow, specimens of the flowering plant which produced it, and these were found to agree completely with the *Ipomœa Horsfalliæ,* as described by Sir W. J. Hooker, who established the species (compare *Botanical Magazine,* N. S., Vol. viii, *tab.* 3315. *Ind.* or.). Although the *Ipomœa Horsfalliæ* is described as an East Indian species, there would appear to be no doubt respecting the botanical identity of the plant received from Jamaica, where it must have been introduced. The remarks of Sir W. J. Hooker (*loc. cit.*) concerning the plant to which he had given the above-mentioned name may be deemed of sufficient interest to record in this connection.

In so extensive a genus as the present, and where many of the species are necessarily very imperfectly described, it behooves us to constitute new ones with great caution; and it is not until a careful comparison of the present individual, unquestionably one of the most beautiful, with all the descriptions to which I have had access, and with a most extensive collection of the genus in my herbarium, that I have considered it to be new, and have given it the name of the lady to whose kindness I am indebted for the drawing. The seeds were received by Charles Horsfall, Esq., either from Africa or from the East Indies, and raised by his very skilful gardener, Mr. Henry Evans, at Everton, where the plants produced their lovely blossoms in great profusion during the months of December and January (1833-4), a season when so gay a visitor is particularly welcome to the stove. Mr. Evans informs me that he has it under the name of *I. pentaphylla;* but the species so called by Jaquin has hairy leaves, and is in other respects quite a different plant, while the *I. pentaphylla* of Cavanilles (*I. Cavanillesii,* Roemer et Schultes) is still more at variance with our species. *I. Horsfalliæ,* in its inflorescence and blossoms, bears the closest affinity with *I. paniculata,* Br. (*Convolvulus,* L.), but their foliage is so different that the two plants can never be confounded: the former having compound and quinate leaves, while those of the latter are simply lobed.

EXPERIMENTAL.

The tuberous root of *Ipomœa Horsfalliæ,* Hooker, which formed the subject of the brief investigation here described, is represented in the plate accompanying this paper. It was light brown in color, with darker colored spots, and showed in places an exudation of black resin. The length of the root was 0.38 metre, its circumference at the largest part 0.37 metre, and it weighed 2395 grammes. The presence of an abundance of starch was evident when a section of the root, moistened with iodine, was observed under the microscope.

The root was sliced, and then dried in a water-oven, when it weighed 408 grammes, the loss of weight in drying having thus been 1987 grammes, or nearly 83 per cent. The dried material was ground to a fine powder, when it amounted to 385 grammes. It was then brought into a large Soxhlet apparatus, and thoroughly extracted with hot alcohol, the greater portion of the alcohol being subsequently removed, and the resulting extract distilled in a current of steam. The distillate was found to contain only traces of formic and butyric acids.

After the above-described treatment, the contents of the distillation flask consisted of a dark red, aqueous liquid, together with a small amount of resinous material. The liquid was filtered, and the resin repeatedly washed with hot water, after which the resin was dissolved in a little alcohol, the solution evaporated to dryness, and the residue dried at 100° C. The amount of resin obtained was 9.6 grammes, thus corresponding to 2.5 per cent. of the weight of dried, or 0.4 per cent. of the weight of the entire fresh root.

The resin formed a dark brown, spongy mass, which became somewhat sticky on exposure to the air. It was found to be almost completely soluble in ether.

Optical Rotation of the Crude Resin.

The optical rotatory power of the convolvulaceous resins has been considered to afford some indication of their identity or purity.[1] As this factor has previously been determined for several such resins, including those of *Ipomœa purpurea,* Roth, and jalap by the present authors,[2] it was deemed of interest to make this determination with the resin under examination. For this purpose 1.0 gramme of the crude resin was dissolved in absolute alcohol, and the solution treated with successive small quantities of animal charcoal until it was nearly deprived of color. The rotation of this liquid in a 2 dcm. tube was $-0°54'$, and the amount of substance contained in 10 c.c. of the liquid, after drying at 105–10° C., was 0.1584 gramme, whence $[\alpha]_D -28.4°$. It may be noted that this degree of optical

[1] Compare Guigues, *Journ. de Pharm. et de Chim.*, [6], **22**, 241, and *Chem. Centralblatt*, 1907, Bd. I, p. 309. Also *Bull soc. chim.* [4], **3**, 872, (1908).

[2] This JOURNAL, 1908, **80**, p. 253, and *Journ. Amer. Chem. Soc.*, 1910, **32**, p. 85.

activity is considerably lower than that of either of the above-mentioned resins, and appears to approximate most nearly to that of the resin from *Ipomœa orizabensis,* Ledanois, which has been recorded by Guigues (*loc. cit.*) as varying from — 23.30′ to — 25°.

Extraction of the Resin with Various Solvents.

A small portion of the resin (1.0 gramme) was reserved for a physiological test, and the remainder (7.6 grammes) dissolved in alcohol, the solution being brought onto prepared sawdust, and the mixture thoroughly dried. It was then successively extracted with light petroleum, ether, and alcohol, when the following amounts of extract, dried at 100° C., were obtained:

Petroleum (b. p. 40–60° C.)	extracted 4.92 grammes, or	64.7 per cent.
Ether	extracted 1.90 grammes, or	25.0 per cent.
Alcohol	extracted 0.60 grammes, or	8.0 per cent.
Total	7.42 grammes, or	97.7 per cent.

Petroleum Extract.—This was a soft, brown resin. It was heated in a reflux apparatus with an alcoholic solution of potassium hydroxide for several hours, after which the alcohol was removed, water added, and the alkaline mixture extracted with ether. The ethereal liquid was dried, and the solvent evaporated, when a small quantity of solid material was obtained. This yielded a little of a crystalline substance, which melted at 132–133° C., and gave the color reactions of the phytosterols.

The alkaline liquid which had been extracted with ether was acidified, and again extracted with this solvent, the ethereal liquid being dried and evaporated. A small amount of acid was thus obtained, which was distilled under diminished pressure, when it partially solidified. The oily portion was unsaturated, since it absorbed bromine in chloroform solution. The solid portion was recrystallized from dilute acetic acid, when it melted at 56–58° C. It was thus evident that the original product consisted of a mixture of acids, but the amount was too small to permit of their further separation.

Ether Extract.—This extract, like the preceding one, was a soft, brown resin. On redissolving it in ether a very small amount of a sparingly soluble substance separated, which was collected. This was found to give a color reaction similar to that yielded by

the phytosterols, and it probably consisted of one of the dihydric alcohols, such as ipuranol and ipurganol, which have previously been isolated by us from convolvulaceous resins (*loc. cit.*) and other sources. The exceedingly small amount of this substance rendered it impossible to identify it.

The ethereal liquid was subsequently shaken successively with solutions of sodium carbonate and sodium hydroxide, but only resinous material was thus removed, and on finally evaporating the ether only a trace of yellow resin remained.

Alcohol Extract.—This extract, which was very small in amount, resembled the two preceding ones, and even after prolonged drying it could not be reduced to a powder. Its alcoholic solution was treated with baryta, and allowed to stand in a warm place for twelve hours, after which the alcohol was removed, water added, and the barium precipitated by means of sulphuric acid. The filtered aqueous liquid did not reduce Fehling's solution until after heating with a drop of concentrated sulphuric acid, thus indicating that at least a portion of the alcoholic extract of the resin was glucosidic.

Examination of the Aqueous Liquid.

The aqueous liquid, as above indicated, represented that portion of the alcoholic extract of the root which was soluble in water, and from which the small amount of resinous material had been removed. It was first shaken with ether, and on adding to the ethereal liquid a little aqueous alkali the latter solution showed a blue fluorescence. This was probably due to the presence of traces of β-methylæsculetin, $C_9H_5(CH_3)O_4$, a substance which we have previously shown (*loc. cit.*) to be a constituent of jalap resin.

After extracting the aqueous liquid with ether, it was treated with a solution of basic lead acetate, which produced a light brown precipitate. This was collected, washed with water, and then suspended in water and decomposed by hydrogen sulphide. On filtering the mixture a liquid was obtained which gave a slight brown coloration with ferric chloride, but it yielded nothing definite. The filtrate from the lead subacetate precipitate was treated with hydrogen sulphide for the removal of the excess of lead, and again filtered. On concentrating this liquid a dark colored syrup was obtained, which contained a quantity of sugar, since it readily yielded *d*-phenylglucosazone, melting at 213–214° C.

In order to ascertain whether the resin obtained from the root of *Ipomœa Horsfalliæ*, Hooker, possesses any physiological activity, a test was kindly conducted for us by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories. One gramme of the resin was administered to a small dog, but no purgation was produced, nor could any other effect be observed.

It is evident from the results of the preceding investigation that the root of *Ipomœa Horsfalliæ*, Hooker, does not possess any constituent which would render it of medicinal value, for even the very small proportion of resin which it contains appears to be devoid of any marked physiological action.

In conclusion we desire to express our thanks to Mr. E. M. Holmes, F.L.S., for the great pains he has taken to secure the botanical identification of the material supplied to us.

THE BIOLOGICAL STANDARDIZATION OF DRUGS.*

By Robert A. Hatcher and J. G. Brody.
Laboratory of Pharmacology, Cornell University Medical College.

This comprehensive title was chosen by one of us some months ago with the intention of presenting brief outlines of a number of methods of biological standardization which retail pharmacists would find available.

Since then we have been devoting most of the time at our disposal for the purpose to the study of one group of drugs and we shall therefore limit the scope of the paper to a single method, and a consideration of some of the drugs for which the method is adapted.

Crawford (Am. J. Pharm., vol. 80, 1908, p. 321) has given an excellent review of a number of the more important methods of biological assay. He says: "The group of digitalis, strophanthus, and squill is the most important one which we as physicians have to use, and it urgently demands standardizing." He quotes Naunyn as saying that he would not care to be a physician without digitalis. He also quotes Dixon as saying: "For my part I unhesitatingly

* Read in the Scientific Section of the American Pharmaceutical Association, at Richmond, Va., May 2-7, 1910.

express the belief that many hundreds of patients die annually from digitalis and allies not possessing the virtues required of them." To the foregoing we would add that we are equally convinced that the want of precise methods of dosage is responsible for many cases of poisoning with digitalis, and it is with this group of drugs that we have been engaged for the most part.

We are aware that many will raise the objection that the details of biologic assays are of little more than theoretical importance to the retail pharmacist because he is unable to conduct these operations. We believe that the progressive pharmacist must be prepared to make the simple biologic tests at least, if he is to pretend to keep pace with the progress of his profession, and it is our purpose to outline the technic of our method, which is so simple that it may be mastered by the retail pharmacist, and conducted with the apparatus which he has at hand.

H. C. Wood, Jr., has recently sought to convey the impression that it is hopeless to expect any degree of precision by means of the test on animals even when it is conducted by the trained pharmacologist. Wood says: "And first I shall speak of its limitations. We sometimes read of the physiological test being used as a control of the chemical assay. To attempt to corroborate the findings of the chemist by a test on the living animal is about as sensible as it would be for a navigator to regulate his chronometer by an Ingersoll watch; the relative accuracy of the chemical and physiological assay is about the same as that of the $200 chronometer and the dollar watch."

To this statement we wish to enter certain exceptions.

METHOD.—The method of standardization which we have chosen for the digitalis group and some other drugs, consists in determining the minimal fatal dose per kg. of cat when the drug is injected slowly into the femoral vein, the standard chosen for the digitalis group being the cat unit.

The cat unit may be defined most accurately perhaps, as the amount of crystalline ouabain [1] which is fatal within about ninety minutes to a kilogramme of cat when the drug is injected slowly and almost continuously into the femoral vein. A cat unit is equal to almost precisely 0.1 mg. of crystalline ouabain, or one ten-millionth of the weight of the animal.

[1] The older term ouabain is to be preferred to that of crystalline strophanthin which has lead to much confusion.

We would prefer this definition of the cat unit rather than that which would embrace any digitalis body required to produce a similar effect within the same period of time when used in this way. The reasons for this will be apparent from the discussion of the method.

When crystalline ouabain, amorphous strophanthin, or a preparation of strophanthus is to be tested, it is only necessary to inject the solution from a syringe or burette into the femoral vein until the animal begins to show toxic symptoms. The injection is then interrupted, or continued more slowly until the unmistakable signs of approaching death are seen. These signs are so typical that one is rarely mistaken concerning them. They consist in irregularity of the heart, difficult respiration, convulsions, and frequently a peculiar cry, after which recovery is extremely rare. If death does not occur in a few minutes the injection is continued with extreme caution.

Other members of the digitalis group may be tested in the same way, but the results will be somewhat too high as a rule, and in that case the necessary correction, usually amounting to about 20 per cent., may be made, or the assay may be made more accurately by a modification of the technic. Somewhat more uniform results are obtained if about 75 per cent. of the total amount of the digitalis body is injected in the first fifteen minutes and the remainder in the following hour. These results will still be too high, and we have therefore devised a modification of the method of estimating some of the other digitalis bodies which gives results which we believe to be nearly as accurate as those obtained with crystalline ouabain itself.

It might be better to explain the reason for this modification first, but for convenience the discussion will be given later.

Just as the analytical chemist may find it desirable to determine the alkalinity of a liquid by adding an excess of acid and titrating back with an alkali, so we have been able to obtain more accurate results in some cases when we inject a measured amount of the digitalis body (tincture or infusion of digitalis, or digitoxin) in the first period of about ten minutes, and after an interval of twenty minutes continue the injection, substituting a solution of crystalline ouabain for that of the digitalis body under examination until the death of the animal, or until the toxic symptoms appear. Naturally, we assured ourselves that ouabain was capable of replacing the other digitalis bodies before we adopted this method.

The difference between the amount of crystalline ouabain actually used to complete the assay and 0.1 mg. per kg. of animal (the amount which would have been required in the absence of the digitalis body), represents the activity of the digitalis used.

The following example will illustrate the mode of computing the activity of the digitalis body tested: A tincture representing 70 mgs. of digitalis per kg. of cat was injected into the femoral vein and after twenty minutes the injection of a solution of ouabain was begun. The animal died with the typical symptoms of digitalis poisoning when 0.0142 mg. of the crystalline ouabain per kg. had been injected. The difference between 0.0142 mg. and 0.1 mg. (which would have been required had the ouabain been used alone) is 0.0858 mg. or 85.8 per cent. of a cat unit, hence 70 mgs. of digitalis equals 85.8 per cent. of a cat unit, and 81.6 mgs. of the digitalis equals one cat unit. A duplicate experiment gave 81.8 mgs. of digitalis. That the results obtained by the modified technic are more accurate than those with the continuous injection of the digitalis alone is shown by a comparison of the results of the following experiments intended to fix the minimal lethal dose of digitalis by the vein with those given in Table III.

2/24/'10. Male cat, Wt. 3.65 kgs.
10.30 A.M. Injected 0.085 Gm. digitalis per kg. by vein at once.
10.45 A.M. Emesis. Cat lived over 7 hours, but died during the night.

4/9/'10. Female cat, Wt. 2.02 kgs.
11.40 A.M. Injected 0.080 Gm. per kg. by vein at once.
12.02 A.M. Emesis. (Repeated emesis.)

4/11/'10. Cat weighs 1.68 kgs., having lost 0.34 kg. in weight.
9.42 A.M. Injected 0.075 Gm. digitalis per kg. by vein at once.
9.58 A.M. Death occurred. (Cumulation.)

We have tested the following substances by intravenous injection into the cat: Crystalline ouabain, amorphous strophanthin, strophanthus seed, tincture of strophanthus, digitalis, tincture of digitalis, infusion of digitalis, digitoxin, digitalinum verum, digitalein, adonidin, digalen, amorphous digitoxin so-called, digipuratum, all belonging to the digitalis group, and German digitalin which does act

like digitalis when injected in this way, since it consists largely of digitonin which causes a sharp fall in the blood-pressure when injected into the vein. We examined digitonin and sparteine also, neither of them giving the digitalis action. Strychnine gave fairly uniform results, but the method requires careful control. Nicotine, physostigmine, and aconitine did not give concordant results in the experiments we made, and we have not been able to determine whether it is possible to modify the technic so as to make it available for those bodies or not.

TABLE I.

Equivalents in mgs. per cat unit of various digitalis bodies.

Ouabain, cryst.	0.10
Stroph. amorph. B. and S.	0.13 [1]
Stroph. amorph. Merck	0.17
Digitoxin, cryst.	0.30
Digitoxin, am. so-called	1.20
Digitalinum ver. Kil.	1.50
Stroph. hisp.	1.50
Digitalein	2.90
Adonidin	3.00
Stroph. Kombé	3.00
Digitalin, German	4.00
Digitalis, German	82.00
Digitalis, Eng.	92.00

The estimations in the table were made by the continuous injection of the various bodies mentioned except in the case of digitoxin and the digitalis leaf, and it is quite possible that corrections will have to be made for some of these when crystalline ouabain is used to complete the injection. Attention is called to the similarity of the results reported to those obtained by Worth Hale in comparing crystalline digitoxin with the amorphous so-called (*J. Am. Med. Assn.*, v. 54, p. 35), but we believe that the method reported here has the advantage of greater accuracy and ease with which it may be followed, and of great economy in time.

[1] This amorphous strophanthin of Boehringer and Sons sold in sterile tubes apparently is more active than other specimens of their amorphous strophanthin or that of Merck which we have examined at different times.

TABLE II.

	Mgs. dig. per cat unit.	Mgs. Dig. + ouabain.
A.	75.2	49 + 0.0351
A.	73.5	49 + 0.0333
B.	81.8	35 + 0.0572
C.	81.6	70 + 0.0142
D.	92.3	60 + 0.0350
D.	102.6	60 + 0.0414
E.	96.1	80 + 0.0168

The figures in the first column show the number of milligrammes of digitalis computed to equal 1 cat unit; those in the second and third columns indicate the digitalis and ouabain actually used.

TABLE III.

		Mgs. digitalis per cat unit.
A.	Ger. (old) tr.	96.6
A.		91.0
A.		97.0
A.		122.0
B.	Ger. (new) tr.	96.0
B.	Ger. (new) tr.	98.7
C.	Ger. (new) inf.	96.6
C.[1]	Ger. (new) inf.	98.0
C.	Ger. (new) inf.	103.0
D.[2]	Eng. (new) tr.	113.7
D.[2]	Eng. (new) tr.	113.7
D.	Eng. (new) inf.	115.0
D.	Eng. (new) inf.	122.0
D.	Eng (new) inf.	110.0
D.	Eng. (new) inf.	106.0

The values in Table III were obtained by the injection of digitalis alone (c.f. Table II). A. represents a tincture obtained from leaf ground for percolation by Gilpin, Langdon & Co., in Oct., 1906. B. was from a specimen obtained from the same firm in April, 1910, and was said to have been obtained as recently as possible. D. was from an English leaf obtained at the same time as the German just

mentioned. It was said to be from a carefully collected and treated cultivated leaf.

C.[1] had had 100 mgs. of the same per rectum 3 hours previously.

D.[2] were labelled Mixt. A. and B., and the strength of these were unknown to the operator, Dr. Brody. In the first of these two experiments 2.73 c.c. per kg. were used, the cat weighed 1.65 kgs., hence 4.5 c.c. were injected; in the second 3.18 c.c. per kg. were used for a cat weighing 2.22 kg., a total of 7.05 c.c. The first solution represents 125 mg. in 3 c.c., and 3.5 c.c. of the second represents a like amount.

Four estimations of digitalinum verum were made. 1.50; 1.52; 1.56, and 1.80 mgs. respectively were found to be equal to 1 cat unit.

Digitalinum verum and digitoxin being insoluble in water, alcoholic solutions were employed.

Four estimations of digitalein were also made, the equivalents of a cat unit being 2.89; 2.90; 2.98, and 4.50 mgs. respectively. Digitalein being very soluble in water, is used conveniently in this way.

Two lactating animals were given large amounts of strophanthus in one case, and digitalis in the other. The first took 217 mgs. of digitalis per kg. of weight, which is more than twice the amount of this specimen usually required and the second took two and one-third times as much strophanthus as other cats of the same weight. These are the only two instances in which an animal required anything like so much of these two drugs. We are unable to state whether this is a coincidence or whether lactating animals are habitually tolerant toward the drugs of this group. We hope to be able to decide this point in the near future.

Three experiments were made with impure adonidin. The first animal received more than 6 mgs. of the drug per kg. of weight. We had little idea of the activity of the specimen and injected it much more rapidly than in the second and third experiments, hence the excess over that actually required was much greater. This experiment should be disregarded in the calculations. The second and third animals received 2.86 and 3.12 mgs. per kg. respectively.

The results obtained with German digitalin require an explanation. German digitalin is wholly unsuited for estimation by intravenous injection, its true digitalis action being much less than that indicated by the figures in the table, death being due mainly to the

digitonin of which it is chiefly composed. German digitalin probably has no place in digitalis therapy.

When the official preparations of digitalis, such as the tincture, are diluted with water a precipitate occurs, indicated by a faint opalescence, and in our earlier experiments we were unable to get uniform results when these diluted liquids were injected over a period of an hour or more. The injection of a large amount of alcohol is not permissible, and the use of concentrated preparations precludes the same degree of accuracy that is possible with the more dilute liquids. These objections are overcome, in part, by the combined method, in which ouabain is used to complete the estimation.

We have never seen any embarrassment of the respiration beyond some increase in the rate until the heart stopped. The immediate signs of asphyxia with excessive efforts at respiration showed that the respiratory centre was still intact. Furthermore, those drugs which kill by paralysis of the respiratory centre, usually give very variable results when used in this way. Strychnine is an exception, but there are many factors involved in the rapid action of strychnine, and it is quite possible that the sudden death following the intravenous injection is not due to its direct effects on the respiratory centre alone. The fact that the heart stops after all of the digitalis bodies before the respiration is seriously impaired is the strongest answer we can make to the contention of Edmunds and Hale (Hygienic Laboratory, Bulletin, No. 48, 1908), that methods which employ as a standard the minimum lethal dose for the higher animals are not applicable to the physiological assay of the digitalis series.

It is hardly necessary to state that it is a matter of vital importance that a standard shall be found for all the digitalis bodies in which the relative activity of the different members on the human heart may be expressed.

Hale found between 7 and 8 mgs. of digitoxin per kg. of frog, and 600 mgs. of digipuratum per kg. (*J. Am. Med. Assn.*, v. 54, p. 129) necessary to cause systolic standstill in an hour. This is sixteen times the amount of digitoxin, and eight times the amount of digipuratum, required per kilo for the cat's heart in our experiments. On the other hand, we have found less than twice as much strophanthus is required per kilo of frog as for the cat.

The following figures expressed in milligrammes per kg. of frog were obtained by Famulener and Lyons (Proc. Am. Ph. Assn.,

1902, p. 415). Digitalis leaf, 675; digitoxin, 8.7; strophanthus (5 per cent. tincture), 5.625; strophanthin, 0.5 (c.f. Table I); adonidin, 4. They state in their conclusions: Determinations of the relative strengths of different samples of the same drug may be made with precision sufficient for practical purposes by physiological experiments on animals, but, as might be expected, the relative medicinal strength of different drugs cannot be correctly inferred from the observation of a single symptom produced in an animal like the frog. They found differences of less than ten per cent. in duplicate experiments.

A further disadvantage in the use of the frog is due to the differences in the rate of absorption of the different digitalis bodies. Even such closely related bodies as amorphous and crystalline strophanthin differing markedly in this respect. Famulener and Lyons have also called attention to this objection.

We have attempted to compare the results which those authors obtained when working with the frog with those obtained by ourselves with the cat, but the differences are evidently due to differences in the animals and not to the limits of error.

Focke (Pharm. Zeitung, vol. 54, No. 68) says that after further consideration of the subject he believes that it is not feasible to accustom physicians to thinking and calculating the strength of digitalis preparations in frog units.

There are many reasons for believing that the action of the digitalis bodies on the cat's heart is a better index than that on the frog's of their effect on the human heart. Man absorbs strophanthin much as the cat and dog do, and the effects are much the same. Koppe's experiment in which 2 mgs. of digitoxin taken in dilute alcohol caused serious symptoms, shows the possibility of rapid absorption and unusual action; on the other hand, we know of instances in which 2 mgs. of crystalline ouabain have been administered intravenously without causing ill effects, though that is 25 per cent. of the theoretically fatal dose.

The cat is the least resistant to strophanthin and ouabain of all the animals which we have examined, but the rat and mouse alone, so far as our experience goes, are very resistant. There are marked differences in the subcutaneous and intravenous doses for the rabbit and some other animals, but not for the cat and the dog.

The various digitalis bodies are the subject of clinical investigation at the present time in certain of the hospitals in New York,

with the object of comparing their quantitative therapeutic action in connection with the results on the cat's heart, as shown by the experiments which we are conducting.

Naturally, minimal doses are being employed, but the comparative activity of crystalline ouabain and strophanthin even in the doses which have been recommended, seem to explain why positively brilliant results have followed occasionally the intravenous use of these substances.

We believe that the cat unit offers an easy means of computing the therapeutic dose of the various digitalis bodies when these are to be administered intramuscularly or by vein, but the rate of absorption from the alimentary canal must be determined before the oral use of these can furnish us reliable results.

That cumulation does occur with certain of these substances must be admitted, or, what amounts to nearly the same thing, the drug is not excreted or destroyed so readily in some cases as in others.

Strophanthin and ouabain may be repeated more frequently than digitalis, our incomplete investigations leading us to believe that the action of digitalis is far more persistent than is generally supposed.

We believe the outlook is more encouraging now than it has been at any time in the past for putting the therapeutics of digitalis upon a rational basis, but it must be admitted that we have no means at present of securing any degree of uniformity of action after the oral administration of these bodies, though it is not hopeless to look for one which will be absorbed readily from the alimentary canal, and we are endeavoring to find such a member of the group.

DISCUSSION.

The Choice of the Animal.—There are several reasons which influenced us to use the cat. These are in the order of their importance: Accuracy afforded, facility with which they may be obtained, ease with which they may be handled (contrary to common opinion), cheapness, and the fact that their use does not affect the sensibilities of the sentimental portion of the community to the same extent that the employment of the dog does.

The Use of Ouabain to Complete the Reaction after Digitalis.—It is commonly stated that digitalis acts slowly, thus Sollmann, Textbook of Pharmacology, 2nd ed., p. 488, says: "The action of the digitalis group is peculiar, in that it cannot be secured at once, unless

toxic doses are given intravenously. If this is done, the animal goes through all the stages; but even in this case, several hours are required until death occurs, no matter how much of the drug is given."

The latter part of this statement does not apply to the cat, nor does it apply to strophanthin so far as I am aware, nevertheless, it is true that moderate [1] doses of digitalis act much more slowly on the cat's heart than crystalline ouabain does, hence the interval that occurs between the injection of the minimal fatal dose and the death of the animal is longer with digitalis than it is with ouabain, and a greater excess of the digitalis will be injected during that interval. If approximately fifty per cent. of the fatal dose of digitalis is injected into the vein and twenty minutes are allowed to elapse and the injection is then continued using one part of crystalline ouabain in one hundred thousand parts of physiological salt solution, the end reaction is almost as sharp as with ouabain alone, the interval appearing to suffice for the digitalis to exert almost its full action on the heart.

The extraordinary uniformity [2] of the action obtainable with ouabain and other digitalis bodies on the cat's heart calls for some comment. We have been inclined to think that this might be explained by the absence of racial peculiarities, due to the nocturnal habits of the cat whereby cross breeding is almost universal. We are endeavoring to explain this uniformity, and while we believe there is a deeper significance than the one just suggested, we are not prepared to go deeply into a discussion of this phase of the question at present.

The fact that crystalline ouabain is capable of replacing amorphous strophanthin, as well as the digitalis bodies found in the leaf,

[1] Massive doses of digitalis may cause death in 60 seconds, or about half the time required by the largest doses of crystalline ouabain. We believe that this extraordinary rapidity of action of digitalis is attributable largely to digitalein, which also acts rapidly.

[2] Since writing the preceding statement, which was based on a very large number of experiments covering a period of several years, we have found a number of cats which tolerated doses up to nearly fifty per cent. more than that stated. We are unable as yet to explain this. As previously stated, the only ones which succumb to doses below the standard are the excessively fat. The later observations do not prevent the use of this method of standardization, but a somewhat larger number of observations are necessary than would be otherwise.

so far as the direct action on the heart is concerned, lends support to the suggestion made by Schmiedeberg many years ago that all the members of the digitalis group depend on a similar nucleus for their action.

The use of this method of biological assaying and its remarkable accuracy have lead us into the investigation of some problems which we wish to mention at this time, though they have no immediate connection with the subject of the paper. We are employing it to show the degree of absorption which occurs after the oral administration of the various members of this group. The results show that absorption is exceedingly irregular with all of them which we have tested. By this means we have also found that the tincture of digitalis represents the activity of the leaf fully, the marc left after the preparation of the tincture from a specimen of the German digitalis in one case, and from the English in another, being inert. The same may be said of the infusion, at least a one per cent. infusion showed the same activity as the tincture diluted to the same strength, and, as just stated, this fully represented the leaf. We have also found in one case that a carefully prepared tincture of strophanthus, made according to the Pharmacopœial process, represented only about two-thirds of the total activity of the seed, despite the fact that percolation had been continued for one week. The greater part of the strophanthin which is extracted is removed during the first part of the percolation, a part of the strophanthin, or some related body, being removed slowly by percolation. The total active principles of the seed may be removed completely, so far as we have been able to determine, by infusing the finely powdered seed for one hour on a boiling water bath.[1]

The foregoing suggests a number of ways in which the biologic test may be utilized by the retail pharmacist.

Several interesting points are raised by the results with strophanthus recorded in Table I. A specimen of *Strophanthus hispidus* was

[1] Since this paper was read at Richmond we have tested a tincture of strophanthus made by the Pharmacopœial process and found that it did not represent the seed fully, but the marc yielded no active principle to boiling water. Another tincture prepared from the same specimen of seed after removing the fixed oil did represent the seed fully, 1 c.c. being equal to more than 60 cat units. This suggests that the active principle may undergo some change even during percolation or infusion.

It will be remembered that there is no difficulty in exhausting digitalis either by percolation or infusing the powdered leaf.

examined and the tincture and the infusion gave concordant results indicating that 3.5 mgs equalled 1 cat unit. A specimen of the Kombé showed exactly half the activity of the hispidus, 7 mgs. being found to be equal to a cat unit, a tincture and an infusion being likewise examined. Subsequently an authentic specimen of each, obtained from Professor Rusby, was examined, the seed being finely powdered and exhausted by heating on a boiling water bath for an hour. The ratio of activity of the infusions was the same as that just mentioned, but both infusions were much stronger than we had anticipated they would be, and 1.5 mg. of the hispidus and 3 mgs. of the Kombé were found to be equal to a cat unit. The activity of this specimen of hispidus corresponds to about 12 per cent. of Merck's amorphous strophanthin—an activity that has been hitherto unsuspected, we believe.

Conclusions.—The cat affords a simple method of standardizing the drugs of the digitalis group. This method is available for the retail pharmacist who will devote as much care to the process as is required in the chemical assay of opium.

The cat affords a means of comparing the activity of the several digitalis bodies on the human heart. This is not possible on the frog by present methods.

With some of the digitalis bodies, notably digitoxin, the minimal lethal dose for the cat by the vein is determined more conveniently by injecting about one-half of the lethal dose into the vein, and after an interval of about twenty minutes, injecting crystalline ouabain (so-called crystalline strophanthin) until the animal dies.

Crystalline ouabain is capable of replacing any of the digitalis bodies which we have tested so far as the direct action on the heart is concerned, that is, one-half of the fatal dose of any of these digitalis bodies and one-half of the fatal dose of crystalline ouabain will cause death in a short time if they be injected into the femoral vein in the manner described.

The absorption of digitalis and of strophanthus from the alimentary canal is extremely variable, that of strophanthus is far more variable than that of digitalis, for this reason the activity of these drugs cannot be fixed by means of the oral administration.

Cumulation occurs with digitalis to such a degree that no conclusions can be drawn regarding activity from the effects on animals which have been used previously for digitalis, unless many weeks have elapsed since the previous use.

A RACK FOR HOLDING SEPARATORY FUNNELS.*

By J. G. Roberts.

Recognizing the need of a simple and inexpensive separatory funnel holder, the apparatus shown in the accompanying illustration was designed. It is simple in construction and can be made by an

Rack for separatory funnels.

amateur carpenter. It consists of a base 15 in. square. In the centre is fastened an upright rod 22 in. high, and to this rod, which

* Presented before the Scientific Section of American Pharmaceutical Association at Richmond, Va.

passes through the middle of them, are fastened the arms which hold the funnels.

The arms are the same length as the base and in the case of the two upper ones are 4½ in. wide. The space between the supports is arranged so that the stem of one separator extends about one inch into the other. The openings to contain the separatory funnels are 2½ in. in diameter, and are wide enough to permit the bowl of the separator to extend about 1½ in. below the base of the support. A piece, ½ in. wide, is cut out in front of the support to enable the separator to be more readily replaced. The lowest support is the same length as the upper ones but is only 3 in. wide. It contains holes 1¼ in. in diameter for small funnels, in which the last shake-out is filtered into beakers or dishes.

By means of this apparatus it is possible to start an alkaloidal assay in the upper separator, continue through the various shake-outs, and finally filter it directly into the beakers or dishes. Where a drug is to be extracted, Gordin percolators can be supported above the separator and the drug percolated directly into it.

ANALYTICAL DEPARTMENT, SMITH, KLINE & FRENCH CO.

PHARMACY AND THE U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.*

Despite the fact that for upwards of a decade representatives of the Public Health and Marine-Hospital Service have regularly attended the meetings of the American Pharmaceutical Association there appears to exist, even among pharmacists, a lack of appreciation of the varied and far-reaching efforts to protect the health of the American people that are now being made by the several divisions of this service.

The Public Health and Marine-Hospital Service, as now organ-

*THE U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE. At the recent meeting of the American Pharmaceutical Association, in Richmond, M. I. Wilbert, one of the representatives of the Public Health and Marine-Hospital Service, in presenting the felicitations of the Surgeon General of that Service, offered for publication the appended description of the several activities of the present public health service, and called attention to the desirability of having pharmacists better informed regarding the work now being done, under the auspices of the service, for the protection of the public health.

ized, is a bureau of the U. S. Treasury Department, and had its origin, as the "Marine-Hospital Service," in 1798. This service was reorganized in 1870 and in 1902 its duties were materially augmented and its name changed to "Public Health and Marine-Hospital Service." The varied activities of the service are in a measure reflected by the titles of the administrative divisions which include: Marine hospitals and relief, domestic quarantine, foreign and insular quarantine, sanitary reports and statistics, and scientific research.

More detailed information regarding the activities of these several divisions is to be obtained from the service publications, which are classified under five heads: (1) Annual Reports, (2) Weekly Public Health Reports, (3) Public Health Pamphlets and Brochures, (4) Bulletins of the Yellow Fever Institute, and (5) Bulletins of the Hygienic Laboratory.

The importance of the work done in connection with quarantine service at domestic ports, is evidenced by the fact that during the fiscal year ending June 30, 1909, no less than 8266 vessels were inspected and 520 were disinfected as a precaution against yellow fever or plague. Foreign quarantine work includes investigations into the sanitary history of vessels destined for ports in the United States, the inspection of vessels, crews and passengers, and the fumigation or disinfection of ships when necessary.

The Division of Sanitary Reports and Statistics of the Public Health and Marine-Hospital Service collects information regarding the existence and prevalence of quarantinable diseases and the nature and effect of sanitary measures adopted by other countries.

Much of the scientific research work done in connection with the Public Health and Marine-Hospital Service is carried on in the Hygienic Laboratory. The original building of this laboratory, located at 25th and E Streets, N. W., Washington, D. C., was occupied in 1903, and the more recent extension was completed in 1909. It is a brick and sandstone structure, 230 feet long, two stories in height, with basement and attic, and contains 41 rooms.

The personnel of the Hygienic Laboratory, at the close of the last fiscal year, comprised a total of 55 persons: A director, an assistant director, 3 chiefs of divisions, 8 commissioned medical officers, 2 pharmacists, 11 technical assistants, an artist, and 28 attendants. To facilitate the pursuance of the scientific work, the laboratory is

divided into divisions more or less distinct and independent of each other. These divisions include

1. Division of Pathology and Bacteriology,
2. Division of Zoölogy,
3. Division of Pharmacology, and,
4. Division of Chemistry.

The work that has been done in connection with the several divisions of the Hygienic Laboratory has attracted widespread attention and is generally recognized as being of great scientific value.

As a practical illustration of the appreciation of this work by individual citizens, it is but necessary to call attention to the recent gift of $1,000,000 by Mr. John D. Rockefeller for the purpose of eradicating hookworm disease from the Southern States. This gift is not alone a recognition of the scientific character of the work done in the Hygienic Laboratory, but is also a tribute to the ability and worth of the Chief of the Division of Zoölogy, who was the first to call attention to the now widely recognized prevalence of hookworm disease in the Southern States.

In addition to hookworm disease the Public Health and Marine-Hospital Service, largely in or under the auspices of the Hygienic Laboratory, has carried on extensive investigations on the causative factors and the possible prevention of tuberculosis, yellow fever, plague, leprosy, typhoid fever, pellagra, diphtheria, tetanus, rabies, and other infectious and contagious diseases.

The Hygienic Laboratory is by law entrusted with the supervision of the manufacture and sale of sera, vaccines, and similar products, and the Division of Bacteriology has evolved and perfected standards for antidiphtheritic serum and for antitetanic serum that have been accepted without question by the manufacturers of these products and have been favorably commented upon and endorsed by bacteriologists and scientists generally.

The Public Health and Marine-Hospital Service has been repeatedly accused of not giving to pharmacy the recognition that it rightfully deserves in public health work. That this accusation is unfounded and is, in fact, based on a misconception of what pharmacy itself is, or should be, is evidenced by the work now done in connection with the Division of Pharmacology of the Hygienic Laboratory.

Even at the present time this division of the Hygienic Laboratory

is exceeded in size and importance only by the Division of Bacteriology and Pathology, and the scientific work that has been done under the direction of its chief, Dr. Reid Hunt, is widely recognized as being of distinct scientific value. This work is particularly interesting in that it is of prophetic import; being representative of the future of pharmacy and indicative of the work that can be and very properly should be, done by the professional pharmacist if he is to continue as the accepted authority on information relating to drugs and medicines.

Much of the work that has been done up to the present time relates more or less directly to the materials included in the Pharmacopœia of the United States.

One of the earlier bulletins emanating from the Division of Pharmacology, included a discussion of the changes in the U.S.P. VIII, particularly the nature and properties of the new remedies that were included in that book.

More recent bulletins deal largely with compilations of comments on the Pharmacopœia of the United States and the National Formulary. These compilations are being prepared at the request of the Board of Trustees of the U.S.P. Convention, and, it is expected, will be of material assistance in the forthcoming revision of the U.S.P.

While much routine work is done in connection with the examination of chemicals and pharmaceutical supplies, the possibility of making original investigations is not lost sight of and the hours devoted to such investigations are by no means limited to the working hours prescribed by the Government regulations.

The publications emanating from the Division include communications on the study of the various suprarenal preparations, the standardization of preparations of the thyroid gland, the toxicity of acetanilid mixtures, the variability of and methods of standardizing preparations of digitalis, the solubility of pharmacopœial compounds, the melting points of chemical substances, and the application of the U.S.P. analytical methods to the purity rubric.

Even this meagre record should suffice to convince the most skeptical that in at least one of the Government Medical Services, Pharmacy, "*Pharmacia Vera,*" has received proper recognition and that the work now being done in the Division of Pharmacology of the Public Health and Marine-Hospital Service is destined to open up for true pharmacy a field of activity that is as yet but imperfectly occupied.

CORRESPONDENCE.

THE PHARMACEUTICAL SYLLABUS—NATIONAL COMMITTEE.

DEAR SIR:

At a regular meeting of the National Committee held Thursday evening, May 5, 1910, at Richmond, Va., careful consideration was given the question of the completion and revision of the Pharmaceutical Syllabus.

The very favorable reception accorded this work, and the unanimity of opinion touching its importance, inspired the Committee to enter at once upon the task of harmonizing certain details and of adjusting other differences.

It was decided to ask the assistance of the boards of pharmacy and the faculties of the schools at the earliest practicable moment so as to have the study under way before the schools close for the summer vacation.

Therefore, without waiting for the completion of our reorganization, we are bringing this action to the attention of the secretaries of the faculty of each school of pharmacy and of each board of pharmacy.

Kindly secure criticisms and suggestions that may improve the syllabus from your point of view and report the same to the Secretary of the National Committee at the earliest practicable moment.

In the interests of pharmaceutical education.

Very respectfully yours,

WILLIS G. GREGORY, *Chairman,*
HENRY L. TAYLOR, *Secretary.*

Albany, N. Y., May 16, 1910.

THE PHARMACEUTICAL SYLLABUS.

Reorganization.—The first edition was published February 18, 1910. The Committee of 21 thereupon entered on a discussion of the question of its completion and revision.

The New York State Board of Pharmacy, on the recommendation of the Committee, gracefully consented to its effacement from the leadership in this important movement by copyrighting the syllabus in the name of the National Committee. This action materially increases the responsibility of the National Committee by

placing on it the task of continuing the work and of issuing a revised edition.

To conserve the truest interests of pharmacy and thus to deserve the support of those national organizations most closely representing those interests, it was felt that the Committee should be reorganized so as to have a vital relation and be directly representative of the three great national bodies most deeply interested in the progress of pharmacy. On formal motion, it was

Voted to recommend that this responsibility be assumed by the American Pharmaceutical Association, through its Section on Education and Legislation, the American Conference of Pharmaceutical Faculties, and the National Association of Boards of Pharmacy.

These recommendations were made by the Chairman of the subcommittees at the Richmond meeting. As a result the American Pharmaceutical Association amended its By-Laws by increasing the number of Committees by one—" a committee on the Pharmaceutical Syllabus of seven members "—and provided for the appointing of members to the same by the President of the Association as follows: " One member shall be appointed for seven years and one for six, five, four, three, two and one years respectively; each vacancy occurring from the expiration of term shall be filled for a term of seven years; other vacancies shall be filled at the annual meetings of the Association for the unexpired terms. This committee shall report to the Association through the Section on Education and Legislation; shall be members of the National Committee on the Pharmaceutical Syllabus, and shall recommend to the Association its proportionate share of the current expenses."

The American Conference of Pharmaceutical Faculties provided a new By-Law to the same effect and provided for its proportionate share of the current expenses.

The National Association of Boards of Pharmacy amended its By-Laws in harmony with the same action of the other associations and provided for its proportion of the expenses.

Both the Conference of Faculties and the Boards' Association formally adopted the syllabus as a guide for future examinations, during the syllabus period.

Representatives were nominated and elected from the three associations pursuant to the amended By-Laws, and on Thursday evening, May 5, 1910, on formal call, the National Committee was

reorganized by the election of Willis G. Gregory, Chairman, and Henry L. Taylor, Secretary.

The Chairman was authorized to appoint the members of the various sub-committees and to make the work most efficient has given to each member a first and second choice as to assignment.

On formal motion, it was

Voted that for the purposes of special meetings called by the Chair, the quorum be seven.

Voted to ask the assistance of the boards of pharmacy and the faculties of the schools of pharmacy in the task of harmonizing certain details and of adjusting other differences with a view to the completion and revision of the syllabus in the near future.

Voted that each sub-division, as soon as appointed, take up the revision of its respective portion of the syllabus and report the same to the Secretary not later than October 1, 1910.

The Secretary was instructed to prepare suitable stationery and to preserve the certificate of copyright.

The National Committee.—The organizations they represent, the period of time for which appointed at the Richmond meeting, and their addresses that will secure quickest mail delivery.

AMERICAN PHARMACEUTICAL ASSOCIATION.—Willis G. Gregory, C. S. N. Hallberg, E. G. Eberle, Harry B. Mason, Charles Caspari, Jr., George M. Beringer, Henry L. Taylor.

BOARDS OF PHARMACY.—Ernest O. Engstrom, Samuel L. Hilton, Charles Gietner, Charles T. Heller, David F. Jones, Clarence O. Bigelow, Ernest Berger.

AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES.—James H. Beal, Henry H. Rusby, J. O. Schlotterbeck, Julius A. Koch, William C. Anderson, Clement B. Lowe, Henry V. Arny.

BOOK REVIEWS.

ALLEN'S COMMERCIAL ORGANIC ANALYSIS. Fourth Edition. Volumes I and II. Edited by Henry Leffmann and W. A. Davis. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut St. 1909, 1910.

Allen's commercial organic analysis is so well known to all those who are engaged in the assaying and examination of the various organic chemicals and products employed in the arts, manufactures, and in medicine, that the mere mention of a new edition is sure to be welcome news. Volume I deals with the alcohols, carbohydrates, yeast esters, aldehydes and vegetable acids, while in Volume II are given the fixed oils, fats and waxes, soap, glycerol and wool fat. The editors, who are also well known analysts, have been assisted by 13 contributors who are specialists in their respective fields. The text has been completely re-written and a very large amount of new matter has been added.

The present edition is an ideal laboratory manual in that "much descriptive matter now fully treated in text-books on chemistry and technology has been omitted" and with the aid of a large number of specialists, "each entrusted with the task of bringing a particular section up to date," there has been produced what is essentially a practical work on the properties and methods of analysis of organic substances.

There has been some re-arrangement in the distribution of some of the topics. The examination of malt has been transferred to the section on "Malt Liquors," where it belongs. The subject of Cellulose Nitrates has been transferred to the section on "Smokeless Explosives." The chemistry of explosives will be published in a separate volume to be published later.

The introduction, including methods of conducting organic analysis, has been written by Wm. A. Davis. The chapters on "Alcohols" and "Wines and Potable Spirits" were prepared by G. C. Jones. The article on "Malt and Malt Liquors" was prepared by Julian L. Baker. Emil Schliching wrote the monograph on "Yeast, Pure Culture Yeasts and Compressed Yeast." The chapters on "The Neutral Alcoholic Derivatives," "The Acid Derivatives of Alcohols" and "Soap" were prepared by Henry Leffmann.

E. Frankland Armstrong wrote the monographs on "Sugars" and "Starch and its Isomers." The portion on "Paper and Paper-Making Materials" is the work of R. W. Sindall. The monographs dealing with "Fixed Oils, Fats and Waxes" and the one on "Lard" were written by C. Ainsworth Mitchell. A chapter on "Special Characters and Methods" in the analysis of the fixed vegetable and animal fats is the work of Leonard Archbutt. The analysis of "Butter Fat" received the special attention of Cecil Revis and E. R. Bolton. C. A. Klein wrote the chapter dealing with "Linseed Oil." W. Robertson is the author of the chapter on "Higher Fatty Acids." "Glycerol" is considered in a special chapter by W. A. Davis. The chapter on "Cholesterols" is written by John A. Gardner. And Augustus H. Gill wrote the monograph on "Wool-Fat and Cloth Oils."

The work of each of the contributors has been well done. The editorial work and proof-reading by the editors is of exceptional quality. The printing and mechanical part of the work are excellent. It is not too much to say that these volumes of the new edition will be found indispensable to all analysts and students of organic substances. H. K.

INTRODUCTION TO THE ANALYSIS OF DRUGS AND MEDICINES. An elementary handbook for the beginner. By Burt E. Nelson. 12 mo., ix+ 384 pages. Illustrated. New York, John Wiley & Sons, 1910. Cloth, $3.00 net.

This work is, as stated by the author, of an elementary character and is intended as a handbook in determining the proximate analysis of drugs, medicinal chemicals and mixtures. It is expected to be useful to the student or analyst who has not specialized in drug chemistry. There are eleven chapters as follows: (1) Introduction; (2) Apparatus and Operations; (3) Ultimate Inorganic Analysis; (4) Ultimate Organic Analysis; (5) Determination of Molecular Weights, Common Radicles and Chemical Formulæ; (6 Principles and Methods of Drug Analysis; (7) Analysis of Medicines Generally; (8) The Principles of Microscopical Drug Analysis; (9) Systematic Microscopic Drug Analysis; (10) Assays of Chemicals, Crude Drugs and Pharmaceutical Preparations; (11) Pharmacological Methods. There are in addition 12 tables: (1) Systematic table of organic drug constituents and medicinal chemicals; (2) elementary organic analyses of medicinal chemicals, arranged in order

of their carbon content; (3) melting-points of commonly occurring medicinal chemicals and their derivatives; (4) boiling-point tables; (5) alcohol tables; (6) table of constants of fats and oils; (7) table of volatile oils; (8) glycerin tables; (9) resins, gum resins and balsams; (10) physiological action of some common drugs; (11) table of elements; (12) commonly used metric and English equivalents.

The work contains a large amount of valuable information which, however, is likely to be of more value to the trained analyst than the beginner. H. K.

SQUIRE'S PHARMACOPŒIAS OF THE LONDON HOSPITALS. J. & A. Churchill, 7 Gt. Marlborough St., London, W. F'cap 8vo. Pages 496. Price $5. Net.

This work contains a comparison of thirty of the pharmacopœias of the London hospitals. The idea of the book is to present its readers with a selection of formulæ, framed by heads of the medical profession attached to the various hospitals. The first edition of the London Hospitals' Pharmacopœia was published by the late Peter Squire in 1863, so that for nearly half a century this little book has been a recognized work of reference to the medical profession. It was an extension of the comparison of the three Pharmacopœias of London, Edinburgh, and Dublin, from which the first edition of Squire's Companion to the British Pharmacopœia was evolved. Another of the reasons for producing the first edition was the idea that a publication of a comparison in this form, might suggest to the different hospital authorities, when preparing the new edition of their respective pharmacopœias, whether it would not be advisable to modify many of their formulas so as to assimilate them to those of a like nature in the British Pharmacopœia and thus to simplify and reduce the number of compound drugs.

The seventh edition was published in 1900, and it is a noteworthy fact that in the subsequent 10 years no less than 26 of the London hospitals have produced new editions. So numerous and extensive have been the alterations in the formulæ that this eighth edition had to be practically rewritten. At the same time many new formulæ have been introduced. The work will be found valuable to members of the medical profession, as it represents select methods of prescribing very many drugs, and forms a practical compendium of

prescriptions framed by the leading authorities in the profession.

It will also be found extremely useful by dispensers, not only for the reasons given above, but because it will enable the dispenser often to understand and interpret the wishes of the prescriber, and afford him a ready reference to the recognized formulæ used in the various hospitals. It should prove a valuable counter adjunct.

Many of the sections are of more than ordinary interest, such as—Collunaria, Gargarisma, Guttæ, Injectiones, Lotio, Mistura, Nebula, Pasta, etc. The comparisons of peptonized foods and nutrient enemata are worthy of special attention, as they represent a very careful comparison and elaboration of the formulæ given in the various hospitals in which these subjects are dealt with.

A leaflet descriptive of the book, which reproduces typical specimen pages, and which briefly reviews its aims and objects, will be forwarded gratis to those applying for it, to—Squire & Sons, Chemists on the Establishment of His Majesty, The King, 413 Oxford Street, London, W.

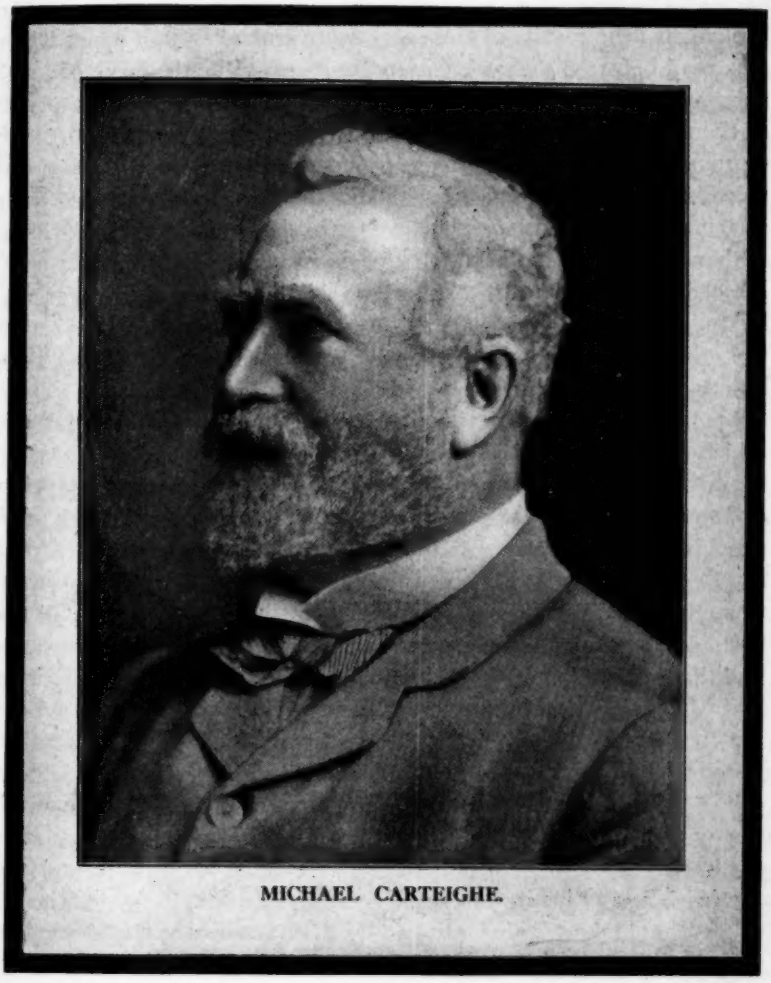
OBITUARY.

Michael Carteighe.*

It is with profound regret that we have to record the death of Michael Carteighe, which occurred at an early hour on the morning of May 30, 1910. Although those who knew him intimately were not wholly unprepared for the intelligence which it is our painful duty to communicate, the news will come as a shock to that large circle of acquaintances who in later years had known him only as a member of the Council of the Pharmaceutical Society. That circle embraced the whole of the pharmaceutical body at home, as well as

*Those of us who attended the Chicago meeting of the American Pharmaceutical Association, in 1893, well remember the striking personality of Michael Carteighe, then president of the Pharmaceutical Society of Great Britain and the bearer from that society of the Hanbury Medal to Prof. John M. Maisch, to whom it was awarded that year. The accompanying presentation address is published in the Proceedings of 1893, pp. 29–31. The writer also well recalls the presence of both Mr. Carteighe and Mr. Martindale on account of their participation in the discussions of the A. Ph. A. and those of the International Pharmaceutical Congress. Mr. Carteighe was an honorary member of the Philadelphia College of Pharmacy, having been elected in 1889.—Editor.

a large number of pharmacists in the Colonies and foreign countries, and men of science of all nationalities. Michael Carteighe was a scion of a County Cork family, though born in Lancashire in 1841.



MICHAEL CARTEIGHE.

He came to London at an early age, and received his preliminary scholastic training at a Clapham school. Later he served his apprenticeship to pharmacy with Mr. Radermacher, of New Cavendish Street, London, after which he became connected with University

College, Gower Street, first as a student and later as a Demonstrator in Chemistry, working under Professor Williamson. There he took part in many important chemical and physical researches, one of the most notable being an investigation of the electrical conductivity of alloys, wherein he was associated with Drs. Matthiessen and Holzmann; the results of this work were embodied in a paper which was read before the Royal Society, and served as the basis of much subsequent work on the same subject. It seemed at this period as though the erstwhile pharmaceutical apprentice would be attracted permanently to a scientific career, but Fate intervened, and it was considered desirable that he should become fully qualified as a pharmacist, and join his elder brother in the conduct of the business with which the name of Carteighe has ever since been associated. Accordingly, the year 1862 found Michael Carteighe duly entered as a student at the Pharmaceutical Society's School of Pharmacy. He passed the Minor Examination on April 15, 1863, and three months later he passed the Major Examination. His success at the School gave promise of a successful and useful career—a promise which has been amply fulfilled. To say that he won the medal for chemistry and pharmacy, the medal for botany and materia medica, and the Pereira medal, would be to give but an inadequate idea of his scholastic achievements. A proper estimate of his work was formed by Redwood, who, as Professor of Chemistry and Pharmacy, in reporting the result of the competition in these subjects, stated that he took 800 marks as representing the highest value of the answers, and that one student had obtained 765 and another 710. The former was Michael Carteighe; the latter Charles Umney. Professor Bentley was equally complimentary. He said that of Michael Carteighe he could truly say he was an ornament to his teachers and to the school in which he was educated, and he felt sure that he would distinguish himself in his future career. The value of his answers at the written examination was at least equal to that he had ever met with in any institution, and in the *viva voce* examination he had taken the highest value allotted to the answers. But something more striking was still to happen. At the close of the prize distribution Mr. Carteighe surprised the gathering by asking permission to say a few words in reference to the Pereira medal, and before the President had recovered from his surprise the young medalist proceeded to point out the weak points in the examination from which he had successfully emerged. This incident, trivial in itself, throws

an interesting sidelight on the character of this young student. In Carteighe's case it was not mere pushfulness that led him to forsake the beaten tracks of precedents; he felt that reform was needed, that this was the best opportunity for saying so, and he had the courage to take the opportunity. Before passing from this brief glimpse at Carteighe as a pupil, a word should be said as to his conduct as an apprentice. Mr. Radermacher, his old master, testifies to his punctual habits, his attention to instructions, his avidity for knowledge, and his anxiety to make the best use of his time. So from the beginning Michael Carteighe gave indications that much was expected of him, and in this he has not disappointed his old master, who has lived to witness the achievements of his apprentice, and is happily still with us.

In the year following the award of the Pereira medal, Mr. Carteighe was elected an auditor of the Pharmaceutical Society, and thus began an official connection with the Society which lasted without interruption up to the time of his death. Indeed, he attended the meeting of the Council on May 4 last and the meeting of the Library, Museum, School and House Committee on May 11. It was at the end of the year 1863 that he joined the firm of Dinneford and Co., of Bond Street, which was then carried on by his brother, John Carteighe and John Edward Stuart. The business became one of the best known in London, and here the energetic young pharmacist found scope for the application of much knowledge gained while at the School of Pharmacy. Three years later—in 1866—he became a member of the Council of the Pharmaceutical Society, as also a member of the Board of Examiners, but in 1869 a change was made in the By-laws which precluded anyone from filling the duties of Councillor and Examiner at the same time, and he withdrew from the Council, in order to serve the Society as an examiner. It was not until 1881 that he returned to the Council, but in this interval of eleven years he was closely associated with the Society, and performed many important and useful offices. He was the chief organizer of the first annual dinner of the members of the Society, which was held at the Crystal Palace in 1872, and he acted as Local Secretary to the London meeting of the British Pharmaceutical Conference in 1874. In the same year he gave evidence before a Select Committee of the House of Commons on the frivolous prosecutions which had been instituted under the Sale of Food and

Drugs Act, 1872. In 1880 and 1882 he was an honorary General Secretary of the British Pharmaceutical Conference, of which body he was Vice-President from 1883 to 1896. He was English Secretary of the Fifth International Pharmaceutical Congress, which was held in London in 1881, and at which he read a paper on "Pharmacopœia Revision," discussing therein the small share pharmacists had in the work. He came back to the Council of the Pharmaceutical Society in 1881, and in the following year was elected President, an office which he held uninterruptedly for a period of fourteen years.

That Mr. Carteighe was well equipped for the performance of the duties which the office of President involves has already been shown in the foregoing brief sketch of his career up to the time of his election as official head of the Society. But, in order that we may the better appreciate how well fitted he was to guide the destinies of the Society, it is necessary to go back to the year 1866, when he first became a member of the Council. That was at a time when the sale of poisons was under no legal restraint, and at a time when negotiations to secure legislation to place the practice of pharmacy on a regular basis began to come within the scope of practical politics. Carteighe was then a young man—he was, in fact, only twenty-five years old—and had only just been admitted to the counsels of the Society. Notwithstanding this, however, he was the confidant and adviser of Sandford, the then President, with whom he was in constant communication with reference to the pending legislation. The important part he played will never be divulged, for it was for the most part played behind the scenes, but this much we do know, that Mr. Carteighe did his utmost to prevent the insertion in the Bill of the words which became known as the Widow's Clause. He recognized that the position of chemists and druggists would be assailable if those words were inserted, so long as they remained. That his advice was right we learnt to our discomfort by the House of Lords decision in 1881, when, alas, it was too late for the knowledge to be of use. We are betraying no confidences in referring to these negotiations, for Mr. Carteighe himself, speaking at Manchester in 1895, pointed out that the 1880 judgment was due to the fact that in the Pharmacy Act of 1868 they had inserted a clause which differed from every other part of the Act. It began by asserting the necessity—for the safety of the public—

that every person who dispensed poisons should be qualified and registered and then immediately set to work to undo that by saying that, in the event of the death of a registered person, the qualification which was vested in his person should pass to executors, or his widow and children, provided a registered assistant were kept. The report of Mr. Carteighe's remarks on that occasion was as follows: "The insertion of that clause was a grave mistake. He and another member of the Council tried to exclude it from the draft Bill, but were unsuccessful. The Bill created on the one hand a sort of statutory professional title, which was to be purely personal in its character, and, on the other hand, tacked on to it something which simply applied to the conduct of a mere business which went like machinery. If chemists and druggists really believed that it was right and proper that their widows, administrators, or executors should have power to carry on business in the way now provided, it was hopeless and illogical to ask any legislature to deal with company traders."

By a singular coincidence the year in which Mr. Carteighe returned to the Council was the memorable year in which the House of Lords judgment confirmed the view which he had unsuccessfully endeavored to impress upon his colleagues in the years immediately preceding the legislation of 1868—to wit, that the position of chemists and druggists would be assailable always as long as the Widow's Clause remained. Under these circumstances it is natural to assume that Mr. Carteighe and his colleagues realized that the duty of the Society lay in the direction of removing the anomaly thus revealed. Several methods of obtaining this end suggested themselves. In the first place, there was the legislative method, and shortly after the decision the Council drafted a Bill to amend the Pharmacy Act of 1868. The Bill, commonly known as the "Omnibus Bill," contained sixteen clauses, one of which would have limited the period during which executors or trustees could carry on the business of a deceased chemist. The Bill would also have restricted the compounding of medical prescriptions to registered chemists, and have made employers liable for the acts of their assistants; while it was proposed that all duly registered persons should be exempted from serving on juries and inquests. It also provided that "in Section 12 of the Pharmacy Act, 1852, and also in Section 15 of the Pharmacy Act, 1868, the word 'person' shall include corporate bodies." This Bill

was never introduced into Parliament, for the reason that the Council's Parliamentary advisers showed conclusively that there was no prospect of proceeding with it successfully. Another Bill was drafted shortly afterwards, but never introduced, in which it was provided that in Section 12 of the Pharmacy Act, 1862, and in Section 15 of the Pharmacy Act, 1868, "words importing the masculine gender shall include the feminine gender, and words importing the singular shall include corporate bodies and the plural." In 1883, the second year of Mr. Carteighe's presidency, another Bill was drafted on similar lines; it contained twenty-three clauses, and shared the fate of its predecessors for a similar reason. So far as any attempt at legislation was concerned, matters were then allowed to remain in abeyance until 1887; when the measure of four clauses, which is usually known as the "Curriculum Bill," was produced, with the underlying idea that improvement of the status of the pharmacists by educational means was probably the best way of removing existing difficulties. That Bill was introduced into the House of Commons, and might have passed the second reading, but unfortunately none of those in charge of the measure were present when the opportunity presented itself for proceeding with the Bill. A fourth attempt was made in 1888, when a Bill was drafted in which it was again sought to secure powers to establish a curriculum. That Bill was introduced into the House of Lords by the Earl of Milltown; it passed through the Upper House, but did not get beyond its intitial stage in the House of Commons. Another Bill dealing with education and the establishment of a curriculum was drafted in 1889, but it was not proceeded with owing to lack of support and the prevalence of the idea that it was not worth while to trouble Parliament about pharmaceutical education alone. A sixth Bill, promoted by the Council in 1890, contained a clause dealing with the proposed curriculum, and another restricting the dispensing of medicines to registered chemists. This was the measure on behalf of which Mr. Michael Carteighe endeavored to arouse enthusiasm by addressing meetings of chemists and druggists in various parts of Great Britain. He failed, however, to obtain any material support, and the Bill was not introduced into Parliament. A seventh Bill, on similar lines to that of the previous year, was drafted in 1891 and introduced into Parliament, but it was not fortunate enough to secure a second reading. Three years later another

Bill was proposed, with the two-fold object of admitting Associates of the Pharmaceutical Society to full membership and altering the procedure in connection with the retirement of members of Council. It was not proceeded with—again on account of lack of support—nor was a later Bill, drafted in 1895, which dealt with the same subjects and, in addition, proposed to restrict the compounding of medicines to chemists. That measure would also have given the Council power to erase names from the Register of Chemists and Druggists for infamous conduct in a professional respect, as well as to impose an annual fee for registration. Four years later, a Bill drafted with similar objects to that of 1894 received the Royal Assent, during the presidency of Mr. Walter Hills.

The Bills drafted during Mr. Carteighe's presidency by no means represented the whole of the work entailed in the endeavor to overcome the unfortunate difficulties which were shown by the judgment of 1880 to exist. It seemed hopeless to secure legislation to effect the desired purpose, and the Council turned its attention to the possibilities of litigation. The Council was engaged for a long period in the discussion of methods for dealing in the Law Courts with the defects revealed by the decision, the hope of arriving at a satisfactory remedy having doubtless been raised by some of the dicta of Lord Justice Blackburn. One of the results of these discussions was the institution of proceedings against the Leith Depôt, Limited, but the Society was unsuccessful, the High Court of Justiciary holding that the shareholders of a limited company are not personally liable under Section 15 of the Pharmacy Act, 1868.

Litigation and attempted legislation having failed, it remained for Mr. Carteighe to proceed with his own particular policy, the policy of improved education, with which his name will always be associated. No doubt there are many, even among Michael Carteighe's admirers, who still fail to see that his aspiration towards the higher education of pharmacists was engendered by a desire eventually to overcome the difficulties arising out of company trading. This was the case, however; he recognized before anyone else that until pharmacists were fitted by education to take their place among the professional classes, they would never obtain the privileges of those classes, and he set to work to bring the members of the craft to think as he thought. In this he was not wholly successful. Briefly put, Mr. Carteighe's idea was to raise the *status* of the

chemist and druggist, and thus place the Council in a position to ask Parliament for powers to erase from the Register the names of persons guilty of unprofessional conduct. In those days it would have been considered, without doubt, that a registered person who acted as cover to an unregistered person or a company would have been guilty of unprofessional conduct, but unfortunately the members of the craft had not the gift of seeing sufficiently far ahead, and so the policy in its fullest sense never matured. Nevertheless, his educational policy was not wasted, and to-day British pharmacists are reaping the benefit of it. Mr. Carteighe realized the force and the wisdom of the policy of the founders of the Society, namely, that the foundation of effective organization was education in its widest sense, and the major portion of his efforts were devoted to securing for the Society a *status* among recognized technical and scientific institutions of the country. He was successful in bringing the Society to the notice of a number of distinguished men, whose goodwill and co-operation were calculated to be of immense significance to a chartered Society. Among these may be mentioned the late Sir Michael Foster, Professor Dewar, Sir H. W. Acland, Sir Dyce Duckworth, Sir Henry Roscoe, Sir G. Sieveking, Sir Richard Quain, Sir Lauder Brunton, and Sir J. S. Burden-Sanderson. This was part and parcel of his policy to obtain recognition for the Society, by bodies whose influence would be of the utmost value.

Besides the Leith Depôt case already referred to, the outstanding features of the legal work of the Society during Mr. Carteighe's period of office was a long series of important decisions. Thus it was shown by a judgment of the Queen's Bench Division that the use of the title "Shipping Drūggists" by an unqualified person and a qualified person in association is an offence by the former. The word "Seller" within the meaning of Section 15 of the Act of 1868 was defined as the person who actually effects the sale. Proprietary preparations containing poison were shown, in the Piper case, not to be within the exemption of Section 16 (1868) relating to "Patent Medicines." It was held that the sale of a preparation containing poison is a sale of a poison. "Open shop" for the sale of poison was defined as a place where a poison may be purchased by the public. The use of the title "Chemist" was shown to be an offence in Scotland even when such title is associated with modifying words, and the words "Patent Medicines" in Section 16 of the

Act of 1868 were defined as medicines being the subject of Letters Patent in force. In the Piper case, as already mentioned, it was decided by the High Court in 1893 that proprietary medicines containing poison are not within the exemption of Section 16 relating to patent medicines. The Society found, however, that grants of Letters Patent for medicines containing poisons had been applied for with the object of evading the provisions of the Pharmacy Act, and although the Pharmaceutical Society had not the power to oppose the granting of such patents, Mr. Carteighe and the Council came to the conclusion that it was its duty to procure the revocation of such Letters Patent. The first case undertaken was in reference to a patent " for an improvement in cough mixtures," the patentee claiming " a preparation of hedge hyssop in conjunction with one or more ingredients therein described." Among the ingredients were morphine and chloroform, and on the Society's application an order for revocation was made. This case was followed by others, the Society almost invariably meeting with success in the campaign it had undertaken. This is a feature of Mr. Carteighe's period of office which most people may have forgotten, and is recalled to show how he endeavored in every possible way to perform the duties which he felt the Society owed to the public.

In *The Pharmaceutical Journal* Michael Carteighe took a very deep and constant interest. He was a frequent contributor to its pages during the period when the Journal was under the control of an Editorial Committee, and innumerable unsigned articles from his pen have appeared in these columns. It is interesting to note, by the way, that his first communication to the Journal was in 1862, when he directed attention to the fact that a weekly subscription had been commenced by the Associates and Students attending the lectures of the Society for the benefit of the Lancashire operatives who were suffering so severely from the failure of the cotton supply, and asking for subscriptions. *The Pharmaceutical Journal* was not the only publication of the Society in which he took a profound interest. His share in the production of the British Pharmaceutical Codex will probably be regarded, in the years to come, as being not the least important work of the strenuous life which he so largely devoted to the service of the Pharmaceutical Society and its School, for the good of pharmacy in general. Though the idea of the production by the Society of an authoritative formulary appears to have sug-

gested itself to Mr. Carteighe at an early period of his pharmaceutical career, many years elapsed before an opportunity of testing the practicability of any scheme based on that idea presented itself. Private interests blocked the way of progress, and there was a stern fight to wage against inertia, prejudice, and jealousy. Chance, however, provided the needed opportunity in the year 1903, when the judgment in the case of Farmer *v.* Glyn-Jones created a difficulty which, it seemed, could best be met by the publication, under the auspices of the Pharmaceutical Society, of a chemists' formulary of approved remedies. At the Council meeting in August of that year Mr. Carteighe proposed that a Compendium of Medicines in general use should be published by authority of the Council. It was pointed out by Mr. Carteighe that, apart from the British Pharmacopœia and the "Unofficial Formulary" of the British Pharmaceutical Conference, there was no authoritative work dealing with that enormous class of medicines known as domestic remedies. Moreover, it was urged, medical men and chemists and druggists knew less about the compounding of medicines than even they did, and the British Pharmacopœia was no guide to them. It was also insisted by Mr. Carteighe that medical men had not the time to learn how to prescribe properly, much less to learn how to compound medicines, nor was there any authoritative work on unofficial medicines to which they could refer for illustrations of what they ought to prescribe. Mr. Carteighe's motion was carried, a Committee appointed, the work set in hand, and the Codex published in October, 1907. It should be noted that the Council decided that the Codex should not consist solely of recipes for medicines, which, in accordance with the decision of the Inland Revenue with reference to the judgment already referred to, would become liable to medicine stamp duty after January 1, 1904. That was a special difficulty which required special treatment, and for that purpose "The Pharmaceutical Journal Formulary" was compiled, and it is important to note that it was mainly due to Mr. Carteighe's influence that this work was produced, as well as the Codex.

Apart from the anonymous articles already referred to, Mr. Carteighe did not contribute many scientific papers to pharmacy, the best known being the one he read at the British Pharmaceutical Conference at Exeter in 1869 on "Syrup of Iodide of Iron," and an article written for *The Pharmaceutical Journal* in March, 1871, on

"Syrup of Phosphate of Iron and other Syrups containing Phosphoric Acid." At Bristol, in 1873, he delivered a lecture, which was illustrated with experiments, on "The Diffusion and Occlusion of Gases," a lecture which showed his mastery of a difficult branch of physics. But it was his addresses on pharmaceutical politics by which the greater number of pharmacists will remember him. Some of his most brilliant efforts were made extemporaneously on occasions when no reporters were present to place his utterances on record. In speech he was a model of lucidity; he not only knew his subject thoroughly, but had the gift of presenting essential facts in such a way that his hearers not only understood what he intended, but carried away with them what he intended they should remember. His speeches expounded the policy which he consistently and persistently followed. He ever kept in view the main fact that Parliamentary and public recognition can never be accorded to the commercial side of the business of the chemist and druggist, and that protection of the professional side must be won by the exhibition of special fitness in the individuals who claim to work for the public safety. Hence the promotion of sounder education and technical training, the institution of research work, and the perfection of the machinery of examination, which must be forever identified with Mr. Carteighe's name. And hence, too, the metamorphosis in the School and its equipment, the foundation of the Research Laboratory, the development of the Journal, the Museum, and the Library, which earned for him the sobriquet of the "spendthrift President." But who shall say that the money was squandered? Surely not his successors, who have been enabled to harvest in many of the fields he has ploughed!

In 1893 he went to America with a number of members of the Council of the Society of Arts, which for the time being was constituted a Royal Commission for the organization of the British section at the Chicago World's Fair. Among Mr. Carteighe's colleagues on that occasion were Sir Richard Webster, the present Lord Alverstone (Lord Chief Justice of England), Mr. J. Fletcher Moulton, now Lord Justice Moulton, and other distinguished personages. While in Chicago he attended the forty-first meeting of the American Pharmaceutical Association, where he had a very cordial reception and addressed the members present, being introduced to the meeting by Professor Remington as a "gentleman who

is known all over the world in pharmaceutical circles." In this connection it is recorded that a most touching incident occurred when the President of the Pharmaceutical Society of Great Britain announced to the meeting that he was the bearer of the Hanbury Gold Medal which had been awarded to Professor Maisch for distinguished services and for original research in the natural history and chemistry of drugs. Though Professor Maisch was unable to be present at the meeting, this testimonial fortunately reached him while he was in full possession of his faculties, although suffering severely. His face, wasted by the long-continued pain to which he had been subjected, lit up with a smile of pleasure when he received it, but a few short days before his earthly existence closed.

In 1907 Mr. Carteighe left his Bond Street premises, and severed his long connection with the practice of pharmacy; this was a great wrench to him, an uprooting from old associations, which is at all times painful, and was particularly so to one of his temperament. Nevertheless, he continued to conduct his business affairs as usual, and attended the meetings of the Council of the Pharmaceutical Society with his accustomed regularity until the summer of 1908, when illness overcame him for a time, and left in its train the loss of the precious sense of sight, at first partially only, though later he heard us, but saw nothing. This great affliction was in a measure alleviated for a time by some improvement in Mr. Carteighe's general health; he continued to devote much attention to things that had formerly interested him and to allow his sense of benevolence to run riot, and in January last he returned to his work at 17 Bloomsbury Square. From that date until the end was very near he attended every meeting of the Council or Committees, astonishing everyone by his amazing display of energy and the acuteness of his intellect. Here, surely, we have the greatest example of his unfailing courage. Those around him saw—and sorrowed. He was invariably cheerful, though dependent upon the inflections of the voices of those around him to tell him what formerly he was wont to learn largely from their faces. He coupled with a courageous spirit an inexhaustible fund of benevolence, and to what extent it ran will never be told. When the cause of pharmacy required it, his time and purse were alike at its service, and he gave liberally from both. He was never too busy to help; he never turned anyone away empty.

The hopelessness of recounting in a single article a tithe of his services to pharmacy must be apparent to everyone who has followed Mr. Carteighe's career. He was devoted to the Pharmaceutical Society; his life was given unstintingly to its services. More especially is it a difficult task to appraise at its true value the character of one with whom it has been a privilege to labor. Perhaps the true keynote was struck in a character sketch of Mr. Carteighe by "An Old Admirer" which appeared in *The Pharmaceutical Journal* some five years ago. The writer said: "Mr. Carteighe will be known in history not so much for what he accomplished as for what he made possible of accomplishment. He had that attribute of the great man of which Landor speaks—the intellect which puts in motion the intellects of others. He was no rash innovator in politics, for he agreed that experimentalists, though perhaps the best philosophers, are always the worst politicians. With Diogenes in the 'Imaginary Conversations,' he inclined rather to teach chemists their duties, so they might know their interests. Opportunist to the finger-tips, he never took a mean advantage of the weakness of an opponent; vigorous to the verge of brutality, his tenderness to the sick or necessitous is unbounded; Homeric in his mirth, no nature ever responded more sympathetically to the grief of others. In short, a Man, with a rare combination of manly attributes and the concomitant faults common to erring mortals." We take leave of him with feelings of intense sadness and a sense of our irreparable loss. Much was expected of him; he was endowed with great physical and mental gifts, and out of his store he gave his very best to pharmacy.—*Pharm. Jour.*, June 4, 1910, pp. 699–702.

PHILADELPHIA COLLEGE OF PHARMACY.

QUARTERLY MEETING, JUNE 27, 1910.

The quarterly meeting of the college was held in the library, at 4 P.M., the President, Howard B. French, presiding. Fourteen members were present. The minutes of the annual meeting held March 28th, were read and approved. The minutes of the Board of Trustees for April 5th, May 17th and 24th were read by the Registrar, Jacob S. Beetem, and after several minor corrections, were approved.

Prof. C. B. Lowe, for the Committee on Membership, reported

the changes in membership during the year, and made some suggestions regarding additional members.

Prof. S. P. Sadtler, for the Committee on Necrology, reported the names of deceased members as follows: Louis G. Bauer, M.D., died May 5, 1910, and he joined the college in 1869. David Jameson, died April 28,, 1910, and he joined the college in 1871. David W. Ross, died May 17th, 1910, and he joined the college in 1879. George M. Beringer, Chairman, for the Committee on Centenary and Historical Committee, reported verbally that the Committees were keeping in view details of the work and would report progress.

Prof. S. P. Sadtler, for the Committee on Revision of the United States Pharmacopœia, reported verbally that a very full report of the proceedings of the convention had been published in the AMERICAN JOURNAL OF PHARMACY for June, 1910, pages 267–282, and he would mention but a few items. The college was, as usual, much in evidence in matters pharmaceutical. Sixteen of the graduates of the college were on the new Committee on Revision.

Prof. Henry Kraemer presented to the college a group picture of the late Committee on Revision, and a reproduction of a bronze-portrait tablet of the late Charles Rice, now in the New York College of Pharmacy. The thanks of the college were tendered the donor.

George M. Beringer, for the delegates to New Jersey Pharmaceutical Association, reported that the meeting was held at Cape May, N. J., June 14–17. This was the fortieth annual meeting of the oldest state pharmaceutical association in America. Mr. Edward A. Sayre, of Newark, presented an excellent historical address, describing a number of the important events in its history, and reviewing some of the problems and papers discussed during this period. Some seven or eight other papers were presented dealing with pharmaceutical subjects. A communication from the women's organization of the National Association of Retail Druggists directed attention to the distasteful methods of advertising certain wares sold by druggists. Resolutions were adopted strongly endorsing the attitude of the association, pledging the support of the members to suppress all forms of improper advertisements.

A special committee was appointed to draft a new pharmacy law to include a prerequisite clause, a proper definition of rural districts, and a revised schedule of poisons. The next meeting of the association will be held at Asbury Park.

O. W. Osterlund, for the delegates to the American Pharmaceutical Association, held at Richmond, Va., reported verbally that the meeting was largely attended. About three hundred members were in attendance, and a very instructive and enjoyable meeting was held. One of the very pleasant incidents of the meeting was a dinner of twenty-nine of the graduates of the Philadelphia College of Pharmacy, who were in attendance.

Prof. Henry Kraemer added that as a very full report of the meeting was published in the AMERICAN JOURNAL OF PHARMACY, June, 1910, pages 282–294, he would only mention the pleasure it gave him to be present at the dinner of the graduates of the college.

Prof. Henry Kraemer proposed the names of four gentlemen for honorary membership which, according to rule, were deferred to the next meeting of the college in September for action.

The President announced the following appointments:

Historical Committee (re-appointed): George M. Beringer, Henry Kraemer, W. H. Poley, Jacob M. Baer, and C. A. Weidemann.

Committee on Necrology: Henry Kraemer, S. P. Sadtler, and C. A. Weidemann.

Committee on Nominations: Joseph W. England, William E. Lee, William McIntyre, Charles H. LaWall, and H. C. Blair.

Prof. Henry Kraemer presented letters from two of our fellow-members for preservation in the historical collection—one from Feliciano Paterno, now a student at Berlin, and one from Manuel Zamora, a pharmacist in Manila.

The college went into executive session at 5.20 P.M. and remained in session till 5.45 P.M., after which it adjourned.

MINUTES OF THE BOARD OF TRUSTEES.

April 5. Nineteen members were present. George M. Beringer was elected Chairman, and Walter A. Rumsey, Vice Chairman. Jacob S. Beetem was re-elected Registrar. A communication from the Secretary of the college was read, giving the names of the officers and members of the Board of Trustees elected at the annual meeting of the college. The Committee on Library reported that they had engaged Mr. Mitchell Bernstein, Class of 1909, to act as temporary Librarian, his duties beginning on April 15th. Committee on Property reported that they authorized the purchase of a

vacuum cleaner for use of the college. Professor Sadtler referred to the work done in the library by Professor F. P. Stroup, who had devoted much time to the rearrangement of the library during the past few months, and moved that a vote of thanks be extended to him. Mr. French, in seconding the motion, expressed his appreciation of Professor Stroup's work. The motion was unanimously carried. The Committee on Appropriations presented their report, submitting the estimated amounts that would be needed for the ensuing year. Committee on Announcement moved that the matter of considering the merger of the Bulletin with the Alumni Report be referred to the Committee of Three, so ordered. The Chair appointed S. P. Sadtler, Joseph W. England, W. A. Rumsey.

The Special Committee on Athletics, which had been considering the advisability of establishing a Department of Physical Culture, made a lengthy report. After some discussion, and amendment, the report was adopted. The Department will be under the control of a Physical Director (preferably one having a medical degree) who will examine the students to determine the amount of physical exercise each one may require. Three members of the Board of Trustees, to be called the Sub-Committee on Physical Culture, will have charge and account for all funds appropriated for this Department.

The usual annual contribution was made to the Intercollegiate Department of the Young Men's Christian Association. Eta Chapter of Kappa Psi Fraternity requested the college to act as Trustee for such funds as they might raise for the purpose of securing a fraternity house. The Treasurer of the college was authorized to act as Trustee for their funds. A request for duplicate diplomas was received from Eugene Jacobs, '88, and H. O. Baer, '01, the originals having been destroyed. The request was granted, under the usual conditions. It was reported that the Wiegand Scholarship Fund amounted to $3212.45. C. Mahlon Kline was elected to active membership.

May 3d. Owing to the absence of a large number of the Board attending the meeting of the American Pharmaceutical Association, no quorum was present, therefore, an adjournment was had, until May 17th.

May 17th. Sixteen members were present. The Treasurer presented his annual report. The Committee on Examinations reported the names of 105 candidates for the degree of Doctor in Pharmacy,

they having complied with all the requirements necessary for graduation; a ballot was taken, and they were duly passed, and it was directed that the degree of Doctor of Pharmacy be conferred upon them. The names of 15 candidates for the degree of Pharmaceutical Chemist were passed upon, and it was directed that the degree of Pharmaceutical Chemist be conferred upon them. The Chairman announced the names of those who were to present the prizes at the coming commencement. The Committee on Instruction presented the annual reports from the Faculty. Abstracts of their recommendations are given as follows:

Department of Pharmacy. Instruction in operative pharmacy was increased 40 per cent. during the year, and it is proposed to still further extend laboratory instruction, and arrangements were made to materially increase the facilities of the laboratories.

Department of Chemistry. It was recommended that during the first seven weeks of the course, that a fairly full outline of elementary physics be taken up, so as to better prepare the students for their chemical course. It was also recommended that an associate Professor of Chemistry be established, so as to relieve the present Professor (Samuel P. Sadtler) from some of his onerous duties, and Professor Freeman F. Stroup was appointed to the position.

Department of Botany and Pharmacognosy. The past college year in this Department has been one of the most satisfactory in the experience of the professor in charge. The third-year class has taken up the study of non-pharmacopœial drugs—especially those used in the formulas of the National Formulary. Great benefit has been derived from the botanical garden and the recently constructed greenhouse. The Jacobs-Maisch Botany prize has stimulated interest in the study of field botany.

The Committee on Examinations submitted a number of recommendations, which were disposed of as follows: The National Formulary together with the United States Pharmacopœia be designated as text-books in the several Departments of Instruction.

The thanks of the Board was tendered to the Lecturers in the Special Course held during the winter. Various other recommendations of the Committee on Instruction were referred to appropriate Committees.

Committee on Library reported that the work rearranging the library was progressing satisfactorily, under the care of the Acting Librarian.

Mr. H. B. Taylor presented to the college a copper mortar and

iron pestle over 100 years old, for which the thanks of the college were tendered the donor. A duplicate diploma was directed to be issued to W. A. Kulp, under the usual conditions.

May 24. Fourteen members present. Committee on Instruction presented a supplemental report. The resignation of E. L. Newcomb, Instructor in Department of Botany and Pharmacognosy, was accepted and the thanks of the Board was voted him for his faithful services. Professor Newcomb has accepted an appointment in another educational institution.

The recommendation that the results of mid-year and final examinations be sent to the parent or guardian of students, on request, was adopted.

The new roster was adopted, subject to such changes as the committee might direct.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

MAY PHARMACEUTICAL MEETING.

The last of the series of Pharmaceutical Meetings for 1909–'10 was held on Tuesday afternoon, May 24, at 3 o'clock. Mr. M. I. Wilbert, of the Hygienic Laboratory, Washington, D. C., presided.

The meeting was devoted entirely to the presentation of abstracts of their theses by some of the members of the graduating class of 1910. Specimens illustrating the results of their work were also shown. There was considerable discussion and the meeting proved to be of interest to all who attended.

The following students participated in the meeting: Peter Amsterdam, Samuel H. Bartholomew, Vastine A. Keister, Wallace E. Klopp, S. D. Lamb, Charles N. Lang, Donald A. McMillen, P. C. H. Webb.

As Professor Kraemer had previously stated that he desired to be relieved of the details and responsibilities of the work connected with the meetings (see this JOURNAL, May, 1910, p. 246) and as the By-Laws provide for the election annually of a secretary or recorder at the meeting in May, he accordingly recommended that Mr. Mitchell Bernstein, P.D., Acting Librarian, be elected to the office, stating that as Librarian he would be in a position to verify statements brought up in the discussion and prepare accurate accounts of the meetings for publication. Mr. Bernstein was then elected to the position of Recorder for the year 1910–1911.

HENRY KRAEMER,
Secretary.